

**COURSE DATA****DATA SUBJECT**

Code: 36346
Name: Introduction to Biochemistry and Molecular Biology
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1109 - Degree in Biochemistry and Biomedical Sciences	Facultat de Ciències Biològiques	1	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1109 - Degree in Biochemistry and Biomedical Sciences	Biología	BASIC

COORDINATION

IGUAL GARCIA JUAN CARLOS

SUMMARY

The course "Introduction to Biochemistry and Molecular Biology" is a basic course of 6 credits to be taught in the second semester of the first year of the Degree in Biochemistry and Biomedical Sciences. The subject is part of the basic "Biology" matter, which also include Biological Diversity (10 credits), Evolutionary Biology (6 credits) and Molecular Biosciences: history, experimentation and society (8 credits).

The course's main objective is to present and introduce students to the fundamental contents of Biochemistry and Molecular Biology which will be developed further in the following courses. It is intended that students acquire a solid foundation on which to build the complete training as biochemists and molecular biologists.

Also, the course aims to provide students of the first year an overview of the impact of Biochemistry and Molecular Biology at the current science and society with special emphasis in the area of Biomedicine.

PREVIOUS KNOWLEDGE**RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE**



There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

COMPETENCES / LEARNING OUTCOMES

1109 - Degree in Biochemistry and Biomedical Sciences

Acquire skills to use the methodologies of molecular biosciences and to keep an annotated record of activities.

Be able to think in an integrated manner and approach problems from different perspectives.

Be able to use new information and communication technologies.

Have capacity for analysis, synthesis and critical reasoning in the application of the scientific method.

Know how to use the different bibliographic sources and biological databases and be able to use bioinformatic tools.

Know the common and differential molecular and cellular elements of the different types of living organisms with special emphasis on the human being and model organisms for their study.

Know the usual procedures used by scientists in the area of molecular biosciences and biomedicine to generate, transmit and disseminate scientific information.

Students must have acquired knowledge and understanding in a specific field of study, on the basis of general secondary education and at a level that includes mainly knowledge drawn from advanced textbooks, but also some cutting-edge knowledge in their field of study.

Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.

Understand experimental approaches and their limitations and interpret scientific results in molecular biosciences and biomedicine.

DESCRIPTION OF CONTENTS

1. Introduction

Biochemistry and Molecular Biology at the Biomedical context. Biochemical interactions in aqueous solution. Biomolecules



2. Structure and function of proteins

Protein structural levels. Protein function: introduction to the phenomenon of cooperativity and allosterism and enzymology.

3. Structure and Function of Nucleic Acids

Structure of nucleic acids. DNA metabolism. Fundamentals in the process of gene expression.

4. Bioenergetics

Thermodynamics of life. ATP biochemistry. Chemiosmotic theory. Proton-motive force: introduction to electron transport chain and ATP synthase. Transport systems through membrane.

5. Metabolism

A first look at the metabolism. Introduction to the central routes of metabolism and the main mechanisms of metabolic control. Metabolic alterations in biomedicine.

6. Methods in Biochemistry

Introduction to basic analytical and separation techniques in biochemistry.

7. DNA technology

Recombinant DNA materially connects Biochemistry and Genetics. Gene "isolation": restriction enzymes and molecular cloning. Plasmids as cloning vectors. Genomic DNA libraries and cloning by complementation. Cloning of mammalian genes: cDNA libraries and heterologous gene expression. The polymerase chain reaction (PCR). Design of PCR primers. Applications of PCR in basic research and biotechnology.

8. Systems biology and -omics techniques

Introduction: a holistic view of biological systems. The tools of systems biology: introduction to -omics techniques. Integrative models.



9. Seminars

Specific topics selected by the teachers will be addressed.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	49,00
Classroom practices	11,00
Total hours	60,00

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	20,00
Independent study and work	20,00
Preparation of lessons	35,00
Preparation for assessment activities	15,00
Resolution of case studies	0,00
Total hours	90,00

TEACHING METHODOLOGY

The development of the subject is divided into:

Lectures. Presentation and discussion of previously announced selected topics. Teaching and bibliographic resources will be available to students in multimedia. The teacher will present the basics of the subject, devoting more time to highly complex issues, and will guide the students in the integration of the contents with related issues of other subjects.

Lectures of questions and problems. Coordinated and parallel to the lectures program classroom, practical classes will be developed. In these classes the student participation through the resolution of issues will be stimulated. They will serve to develop activities that allow students to apply the knowledge acquired in theory classes and learn new skills in addressing scientific problems. In particular, case studies for preparation, study and discussion by students with teacher moderation will be proposed. Before any of the questions sessions, the teacher can request delivery of solved issues. These activities allow to know how students assimilate the concepts and thus help to better evaluate the student's work.

Seminars. Seminars that address issues in Biochemistry and Biomedical not included in the program of lectures will be scheduled in an integrated manner. Students will develop an overview of the seminars or will respond to a questionnaire about it. Attendance at seminars is mandatory.



Review and discussion of news related to the subject. Students will choose a science news appeared in the media related to the subjects of Molecular Biosciences and will perform a critical analysis of it, filling a form.

EVALUATION

The evaluation of the contents of the program will be implemented by a single test that will consist of questions in various formats (multiple choice, questions, problems) to assess the knowledge and understanding acquired by the student on the subject and their ability to use the specific scientific language. The mark obtained in this exam will represent **80% of the final grade**.

The evaluation of the solved questions, seminar reviews and critical commentary on news, represent **20% of the final grade**. Active participation in class activities will be considered.

To pass the course is necessary to obtain a minimum score of 4.5 out of 10 in the examination and a final score equal to or greater than 5 out of 10.

REFERENCES

BASIC

- Nelson, D.L. y Cox, M.M. Lehninger. Principios de Bioquímica. Ed. Omega, 6ª ed., 2014.

ADDITIONAL

- Peretó, J., Sendra, R., Pamblanco, M. y Bañó, C. Fonaments de bioquímica. Servei de Publicacions de la Universitat de València, 5ª ed., 2005 (traducción al castellano, 2007).
- Stryer, L., Berg, J.M. y Tymoczko, J.L. Bioquímica Curso básico Ed. Reverté, 2014.
- Stryer, L., Berg, J.M. y Tymoczko, J.L. Bioquímica con aplicaciones clínicas Ed. Reverté, 7ª ed., 2013.
- McKee, T. y McKee, J.R. Bioquímica. Las Bases Moleculares de la Vida. MacGraw Hill Interamericana Editores, 4ª ed., 2009.
- Mathews, C.K., Van Holde, K.E., Appling D.R. y Anthony-Cahill, S.J. Bioquímica. Ed. Pearson, 4ª ed., 2013.
- Voet, D. Voet, J.G., y Pratt, Ch.W. Fundamentos de Bioquímica: La vida a nivel molecular. Ed. Panamericana, 2ª ed., 2007.
- Alberts, B. y colaboradores. Biología Molecular de la Célula. Ediciones Omega, 5ª ed., 2010.